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PROJECT APOLLO  
SPACECRAFT DEVELOPMENT  
STATEMENT OF WORK

PART 1  
PROJECT SCOPE

(NASA-TM-X-62881) PROJECT APOLLO SPACECRAFT  
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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By authority of SA-1162 Date 12/18/61  
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## 1.1

INTRODUCTION.- In the past, man's knowledge of the cosmos in which he lives has been limited by the earth's atmosphere through which he must view the Universe and by the great distances from which he must view even the earth's nearest neighbors. Now he can send his measuring equipment on satellites beyond the earth's atmosphere and into space on lunar and planetary probes. These initial adventures have already greatly increased man's store of knowledge.

In the future, man himself is destined to play a vital and direct role in the exploration of the moon and of the planets. In this regard, it is not easy to conceive that instruments can be devised that can effectively and reliably duplicate man's role as an explorer, a geologist, a surveyor, a photographer, a chemist, a biologist, a physicist, or any of a host of other specialists whose talents would be useful. In all these areas man's judgement, his ability to observe and reason, and his decision-making capabilities are valuable indeed.

The initial step in the NASA program for manned exploration of space is Project Mercury. From Project Mercury NASA expects to learn much about how man will react to space flight, what his capabilities might be, and what should be provided in future manned Spacecraft, to allow man to function usefully. Project Mercury is the beginning of a series of projects of ever-increasing scope and complexity. The next step is Project Apollo.

The multi-manned Apollo Space Vehicle will provide for development and exploration of manned space-flight technology in the earth-moon space and provide for manned exploration of the moon; and, will be the first step in a long-range program for manned exploration of the planets.

## 1.2

PROJECT APOLLO OBJECTIVES.- The ultimate objective of Project Apollo is the landing of men on the moon, limited observation and exploration of the moon in the landing area, and safe return to earth. Intermediate objectives of the project include scientific observation in the earth-moon space and lunar reconnaissance prior to lunar landing. It is expected that these objectives will be accomplished from a combination of earth-orbital, circumlunar, lunar-orbital, and lunar-landing missions.

In addition to achieving these primary objectives, it is intended that the Apollo Space Vehicle be so designed that it will be adaptable for use as an earth-orbital vehicle for conducting a variety of scientific and technological services.

## 1.3

PROJECT APOLLO DESCRIPTION.- Project Apollo is a multiphase project with each phase serving to the extent possible as qualification for subsequent phases. The various phases are planned to overlap and are as follows:

## 1.3.1

Phase A.- The Phase A Apollo Spacecraft will be designed for the ultimate mission of lunar landing and return. Phase A missions, will, however, be limited to manned, low-altitude earth-orbital flights up to two-weeks duration; and, to unmanned reentry flight from super-orbital velocities. The major effort during the first portion of this phase - approximately the first year - will emphasize (1) study, research, and development testing leading to the definition of comprehensive design and operational criteria; (2) engineering tests, analyses, and mock-ups verifying the technical approach chosen and; (3) manufacture of "test" Spacecraft and long lead-time articles. The specific objectives of Phase A are:

## 1.3.1.1

Qualification.- Qualification of systems to be used in subsequent mission phases within the constraints of the earth-orbital environment or during reentry from super-orbital velocities.

## 1.3.1.2

Crew Reaction.- Study of physiological and psychological reactions and the capabilities of Spacecraft crews under extended periods in the space environment.

## 1.3.1.3

Operational Experience.- Development of flight and ground operational techniques and equipment for space flight of extended periods.

## 1.3.1.4

Experimental Investigation.- Conduct of experimental investigations as needed to acquire information for the lunar missions.

## 1.3.2

Phase B.- This phase will consist of circumlunar, lunar-orbital, and parabolic reentry tests to develop further the space vehicle and operational tests, and to allow close-up reconnaissance of the lunar surface for scientific and technological purposes.

- 1.3.3 Phase C.- This phase consists of manned lunar landing, limited observation and exploration in the landing area, and safe return to earth.
- 1.4 IMPLEMENTATION MILESTONES.- Major milestones in project implementation are shown in figure 1.
- 1.5 PROJECT SCOPE.- The project scope is defined as the total effort required to accomplish the objectives of Project Apollo up through Phase C. The total effort includes study, design manufacture, operational support, and reporting activity initiated and/or conducted for the primary purpose of supporting implementation of the project.
- 1.6 SPACECRAFT DEVELOPMENT SCOPE.- The scope of the contract pursuant to this Statement of Work is restricted to development of portions of the Spacecraft and its ground support equipment, certain operational support and reporting tasks, and their integration with the overall flight and ground systems. The Contractor's tasks are specifically defined in Part II of the Statement of Work, Contractor's Tasks, and are summarized as follows:
- 1.6.1 Design.- The Contractor shall perform such study as required and design the Spacecraft Command Module, Service module, adapter and their systems and GSE. The Contractor shall likewise design all "Test" Spacecraft. The Contractor shall not design the Lunar Landing Module, Space Laboratory Module, Navigation and Guidance Subsystem, certain Crew Equipment, and Flight Research and Development Instrumentation, or their GSE; but he shall integrate their design with the Space Vehicle and Ground Operational Support System.
- 1.6.2 Manufacture.- The Contractor shall manufacture the Spacecraft Command Module, Service Module, Adapter, and their systems and GSE. The Contractor shall manufacture all "Test" Spacecraft. The Contractor shall not manufacture the Lunar Landing Module, Space Laboratory Module, Navigation and Guidance Subsystem, Flight Research and Development Instrumentation, and certain Crew Equipment, or their GSE.
- 1.6.3 Operations.- The Contractor shall prepare the Spacecraft for flight, man the Spacecraft system monitoring positions in the Ground Operational Support System, support the

operation of the overall Space Vehicle, and conduct certain operational analyses.

1.6.4

Program Control.- The Contractor shall perform such duties as required to formulate plans for project implementation and control and shall carry out these plans to the extent of his assigned design, manufacturing, and operational responsibilities summarized above.

FIGURE 1. MAJOR MILESTONES FOR PROJECT APOLLO SPACECRAFT  
FIRST OPERATIONAL MISSION OF A SERIES

MISSION	CALENDAR YEAR					
	1962	1963	1964	1965	1966	1967
RESEARCH AND DEVELOPMENT SPACECRAFT		Δ				
QUALIFICATION OF PROTOTYPE SPACECRAFT			Δ			
MANNED EARTH-ORBITAL SPACECRAFT			Δ			
MANNED CIRCUMLUNAR MISSIONS				Δ *		
MANNED LUNAR ORBITAL AND LANDING MISSIONS					Δ	

\* Feasibility of circumlunar missions using earth-rendezvous is under study